

OPERATING SUMMARY

UNION

WATER SYSTEM

LABORATORY LIBRARY
MINISTRY OF THE ENVIRONMENT

LIBRARY COPY

JAN 16 1976

MINISTRY OF THE
ENVIRONMENT

LAB

1
9
7
4

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca



Ontario

MINISTRY OF THE ENVIRONMENT

MINISTER
Honourable William G. Newman

DEPUTY MINISTER
E. Biggs

ASSISTANT DEPUTY MINISTER
REGIONAL OPERATIONS
J. Barr

REGIONAL OPERATIONS DIVISION

DIRECTOR, SOUTHWESTERN REGION
D. McTavish

MANAGER, UTILITY OPERATIONS
A. Ladbroke

UNION WATER SYSTEM

operated for the

TOWN OF ESSEX
TOWN OF KINGSVILLE
TOWN OF LEAMINGTON
TOWNSHIP OF GOSFIELD NORTH
TOWNSHIP OF GOSFIELD SOUTH
TOWNSHIP OF MAIDSTONE
TOWNSHIP OF MERSEA
TOWNSHIP OF ROCHESTER
H.J. HEINZ COMPANY OF CANADA LIMITED

by the

MINISTRY OF THE ENVIRONMENT

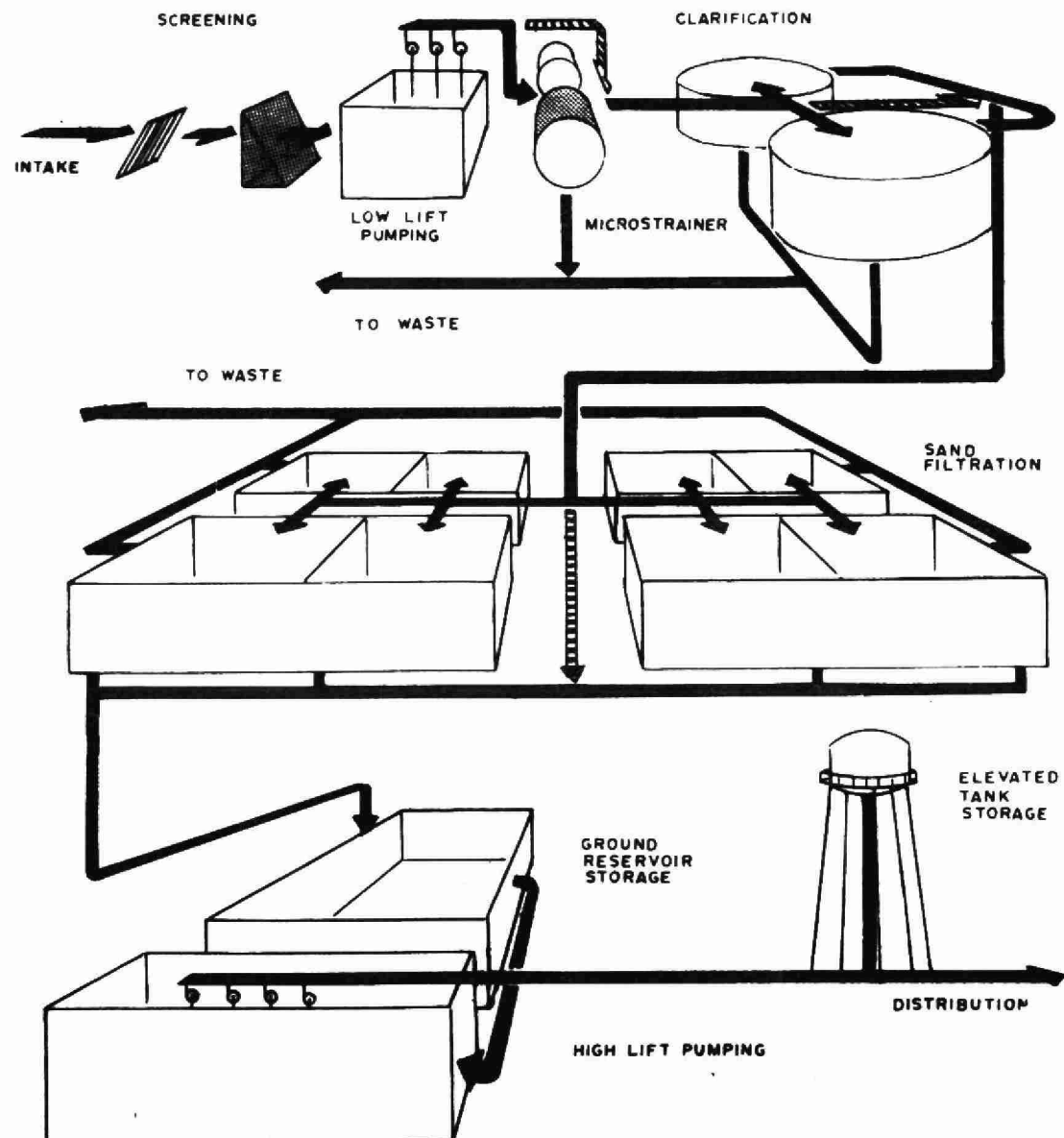
1974 ANNUAL OPERATING SUMMARY

prepared by
Plant Performance Unit
TECHNICAL SERVICES BRANCH
T. Cross, Director

CONTENTS

Title Page	1
Flow Diagram	4
Design Data	5
Operating Cost and Flows	8
Process Data	22

UNION WATER TREATMENT PLANT



DESIGN DATA

UNION Water Treatment Plant

NOMINAL CAPACITY

10.0 MIGD

RAW WATER SOURCE

Lake Erie

CAPACITY OF UNITS

Intake: 32 mgd @ 3.5 ft/sec avg. vel.
Low Lift Pumps: 14.6 mgd @ 132 ft tdh
Microstrainers: 16.0 mgd
Clarifiers: 16.0 mgd
Filters: 8.0 mgd @ 2.15 gpm/ft²
Backwash Pump: 5520 USGPM @ 35 ft tdh
High Lift Pumps: 24.3 mgd @ 200 ft tdh

MICROTRAINING

Two Glenfield 10 ft dia x 10 ft with
MKI (35 micron) fabric @ 16.0 mgd
total capacity

CLARIFICATION

One Graver and one Eimco Re-
activator, each 94 ft dia x 19 ft swd
Volume: 1.65 mil gal
Detention: 2.5 hr @ 16.0 mgd
Overflow: 1160 gpd/ft² @ 16.0 mgd

FILTRATION

Type: Gravity sand filter - 27' sand
depth
Size: Four 18' x 36' double filters
Rate: 2.15 gpm/ft² @ 8.0 mgd
(nominal capacity)
Backwash Rate: 13 gpm/ft²
Jet wash - Palmer surface jet wash

CHLORINATION

Three Wallace & Tiernan 2000 lb/
day chlorinators

HIGH LIFT PUMPING

#6 - 2.60 mgd @ 200' head
#7 - 3.75 mgd @ 200' head
#8 - 5.19 mgd @ 200' head
#9 - 10.35 mgd @ 200' head
#10 - 1.15 mgd @ 200' head

STORAGE

Reservoir: 1.73 mil gal
Elevated Tank: 0.33 mil gal

INTAKE

10' dia. steel bellmouth in 18' x 18'
timber crib
Depth above crib - 15 ft (minimum)
Pipe Size: 1400 ft of 54' dia asbestos
coated corrugated steel pipe-about $\frac{1}{4}$
mile to plant

SCREENING

Coarse Screens - 3" cc
Fine Screens - $\frac{1}{4}$ " mesh travelling
screens

LOW LIFT PUMPING

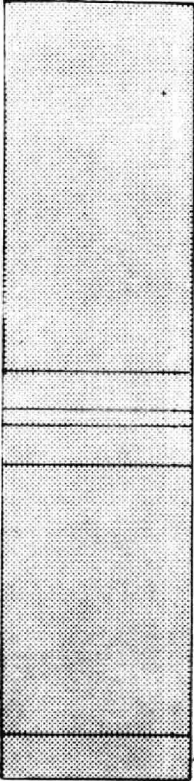
#1 - 2.16 mgd @ 100' TDH
#2 - 4.32 mgd @ 100' TDH
#3 - 4.32 mgd @ 100' TDH
#4 - 2.16 mgd @ 100' TDH
#5 - 6.00 mgd @ 135' TDH

*Note: As of November 1970

—PROJECT COSTS and FLOWS TO PARTICIPANTS—

ANNUAL COSTS

1974 OPERATING COSTS



● SALARIES & WAGES	46 %
● EMPLOYEE BENEFITS	5 %
● TRANSPORTATION & COMMUNICATIONS	2 %
● SERVICES	5 %
● SUPPLIES & EQUIPMENT	36 %
● ACQUISITION/CONSTRUCTION OF PHYSICAL ASSETS	
● TRANSFER PAYMENTS	
● OTHER TRANSACTIONS	6 %

YEARLY OPERATING COSTS

YEAR	WATER TREATED in million gallons	TOTAL OPERATING COSTS	UNIT COSTS
			cents per 1000 gal
1969	1445	146,059	10.1
1970	1547	159,235	10.9
1971	1696	182,404	10.7
1972	1636	183,529	11.0
1973	1737	197,045	11.3
1974	1897	256,304	13.5

OPERATING EXPENDITURES

Regular Staff	\$ 119,387	\$
Casual (Unclassified) Staff	-	
TOTAL SALARIES AND WAGES		119,387
TOTAL EMPLOYEE BENEFITS		11,700
TOTAL TRANSPORTATION AND COMMUNICATIONS		5,349
Insurance	6,103	
Sludge Haulage	-	
Repairs and Maintenance	4,071	
Other Services	1,545	
TOTAL SERVICES		11,719
Machinery and Equipment	4,790	
Chemicals	31,946	
Utilities	45,970	
Other Supplies and Equipment	10,722	
TOTAL SUPPLIES AND EQUIPMENT		93,428
TOTAL AQUISITION/CONSTRUCTION OF PHYSICAL ASSETS		-
TOTAL TRANSFER PAYMENTS		-
OTHER TRANSACTIONS		14,721
GRAND TOTAL	GRAND TOTAL	\$ 256,304

ANNUAL CONSUMPTION BY PARTICIPANTS

PARTICIPANT	MINIMUM ANNUAL QUOTA REVISIONS				ANNUAL CONSUMPTION in millions of gallons and as percent of total (listed below)									
	ORIGINAL	REVISED Jan. 1, 63	PLANT EXPANSION Nov. 1, 70	KINGSVILLE and ROCHESTER Entry: Jan. 1, 71										
					1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
H. J. HEINZ	520	520	520	520	594.00 40.0	572.23 38.0	573.48 39.1	578.71 40.0	551.59 37.7	592.10 36.0	593.58 36.4	676.30 39.3	687.21 36.2	
LEAMINGTON	426	400	400	380	416.38 28.0	416.57 27.6	391.85 26.7	278.71 26.2	379.09 25.9	424.78 25.8	458.70 28.2	457.57 26.6	511.14 26.9	
ESSEX	160	160	180	180	179.12 12.0	195.49 13.0	197.82 13.5	184.72 12.7	188.12 12.9	202.70 12.3	170.43 10.4	163.37 9.5	175.87 9.2	
MERSEA	125	70	140	140	158.53 10.7	165.23 11.0	160.61 11.0	152.48 10.6	173.64 11.9	212.18 12.9	207.67 12.7	214.39 12.4	263.13 13.9	
GOSFIELD S	165	40	100	100	87.37 5.9	102.66 6.8	83.12 5.7	93.82 6.5	102.49 7.0	130.65 7.9	114.14 7.0	117.90 6.8	150.61 7.9	
GOSFIELD N	235	20	35	35	32.93 2.2	31.06 2.1	35.82 2.4	27.81 1.9	31.87 2.2	39.50 2.4	48.22 2.9	48.16 2.8	53.78 2.8	
MAIDSTONE See Note C	12	10	20	20	11.48 0.8	14.72 1.0	13.70 0.9	18.56 1.3	23.17 1.6	25.92 1.6	23.12 1.4	27.75 1.6	35.55 1.9	
KINGSVILLE See Note A	-	-	-	133	-	-	-	-	-	-				
ROCHESTER See Note B	-	-	-	14	6.71 0.5	8.70 0.6	9.12 0.6	11.47 0.8	12.74 0.9	16.35 1.0	16.08 1.0	16.55 1.0	19.71 1.0	
TOTAL	1170.5	1220	1395	1522	1486.52	1506.66	1465.52	1445.28	1462.72	1644.18	1631.95	1721.97	1897.0	

Note A - Kingsville became participant Jan 1/71, however water is not available until completion of project.

B - Rochester became participant Jan 1/71, purchased water through Maidstone prior to this date.

C - Rochester flows have been deducted from Maidstone flows.

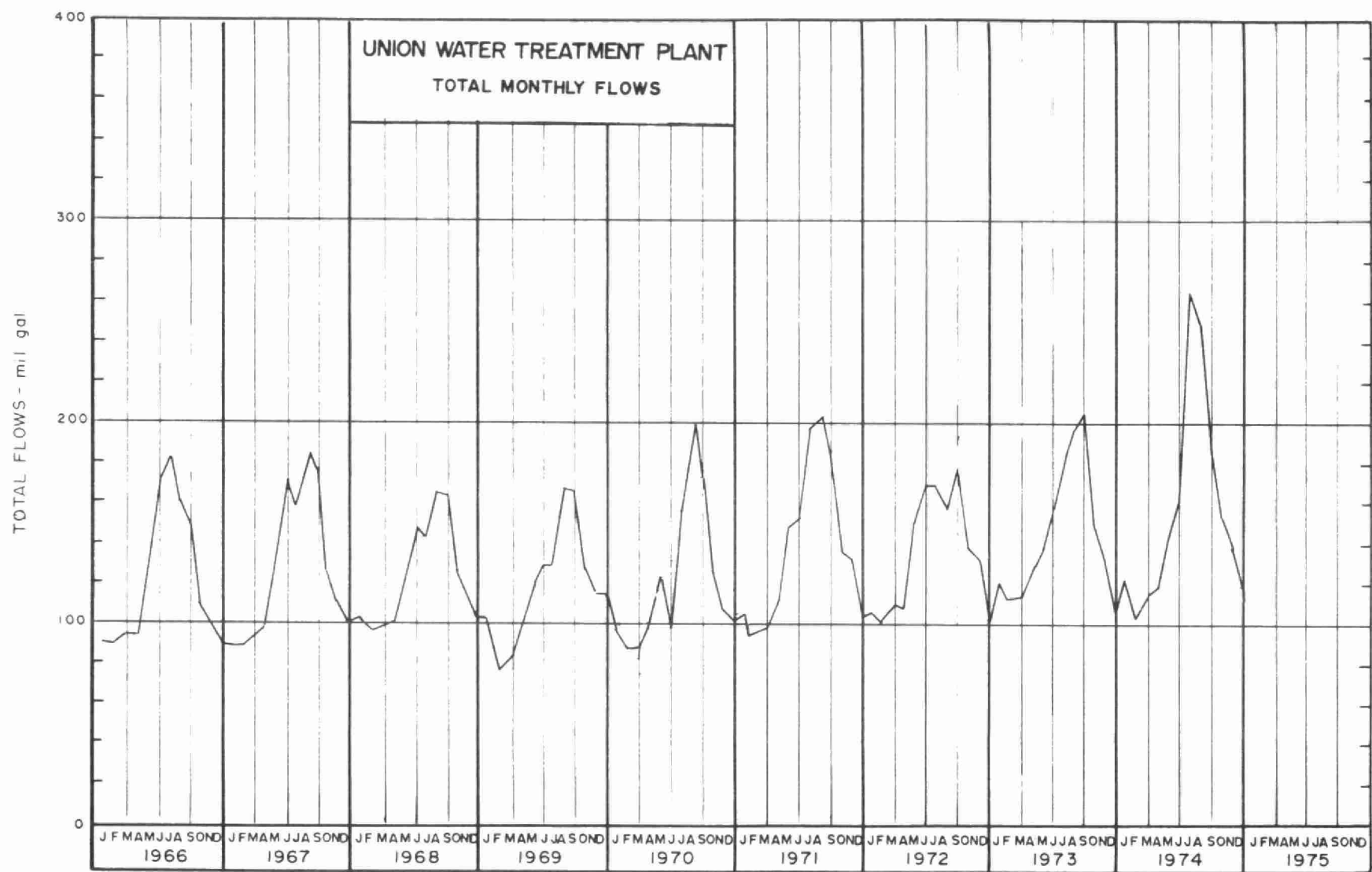
ADJUSTED MONTHLY FLOWS

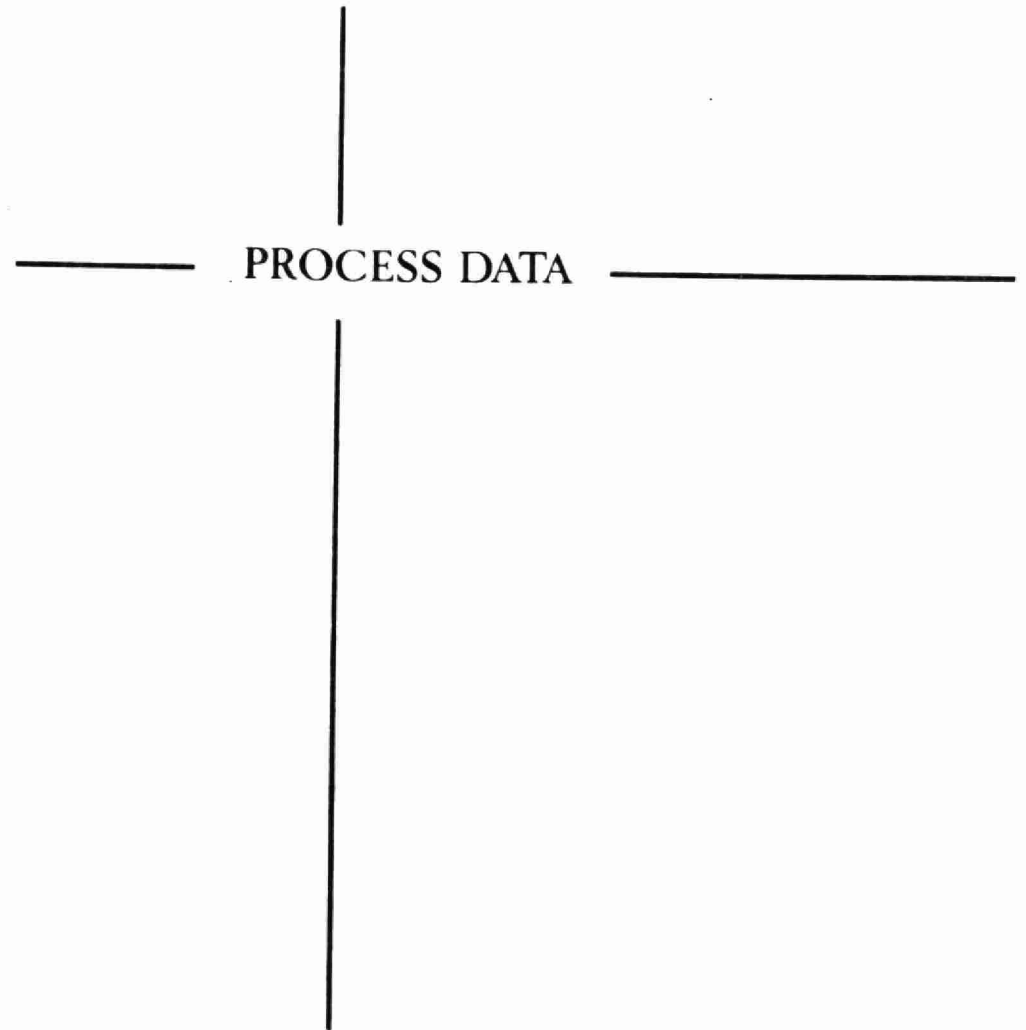
(in millions of gallons)

MONTH	H. J. HEINZ	LEAMINGTON	ESSEX	MERSEA	GOSFIELD SOUTH	GOSFIELD NORTH	MAIDSTONE	ROCHESTER	KINGSVILLE	TOTAL
JAN	48.598	37.471	13.082	14.699	7.370	3.875	2.430	1.347	0	128.872
FEB	44.234	30.598	10.683	12.003	6.019	3.164	1.984	1.100	0	109.785
MAR	41.254	27.956	12.324	14.823	6.491	3.389	2.080	1.154	0	109.471
APR	42.845	29.722	13.103	15.760	6.902	3.603	2.212	1.226	0	115.373
MAY	55.429	33.001	12.256	22.481	11.138	3.417	2.715	1.505	0	141.942
JUN	52.379	42.159	15.658	28.719	14.229	4.366	3.467	1.923	0	162.900
JUL	62.381	84.495	24.994	46.295	32.435	6.797	4.883	2.708	0	264.988
AUG	82.375	68.387	20.230	37.469	26.252	5.502	3.952	2.191	0	246.358
SEP	77.887	48.287	16.209	24.696	12.762	5.809	3.862	2.142	0	191.654
OCT	72.479	39.408	13.228	20.154	10.415	4.741	3.152	1.747	0	165.324
NOV	64.845	35.508	12.286	13.271	8.458	4.647	2.455	1.362	0	142.832
DEC	42.504	34.148	11.816	12.762	8.135	4.469	2.362	1.309	0	117.505
TOTAL	687.210	511.140	175.869	263.132	150.606	53.779	35.554	19.714	0	1897.004

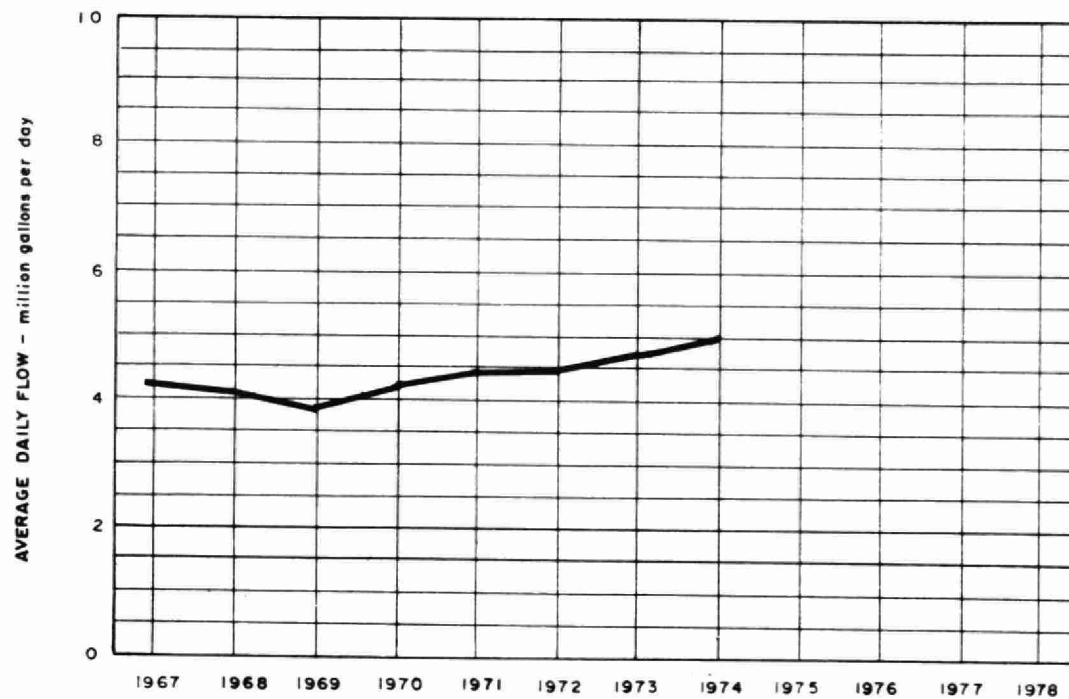
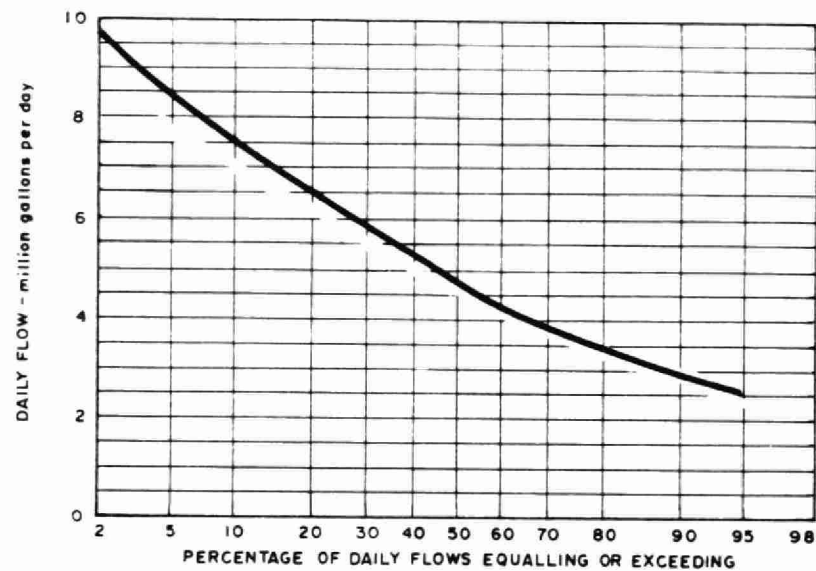
NOTES 1. Kingsville did not receive water from the system in 1974

2. Gosfield North received a credit making their billed total 51.379
and the system billed total of 1894.604





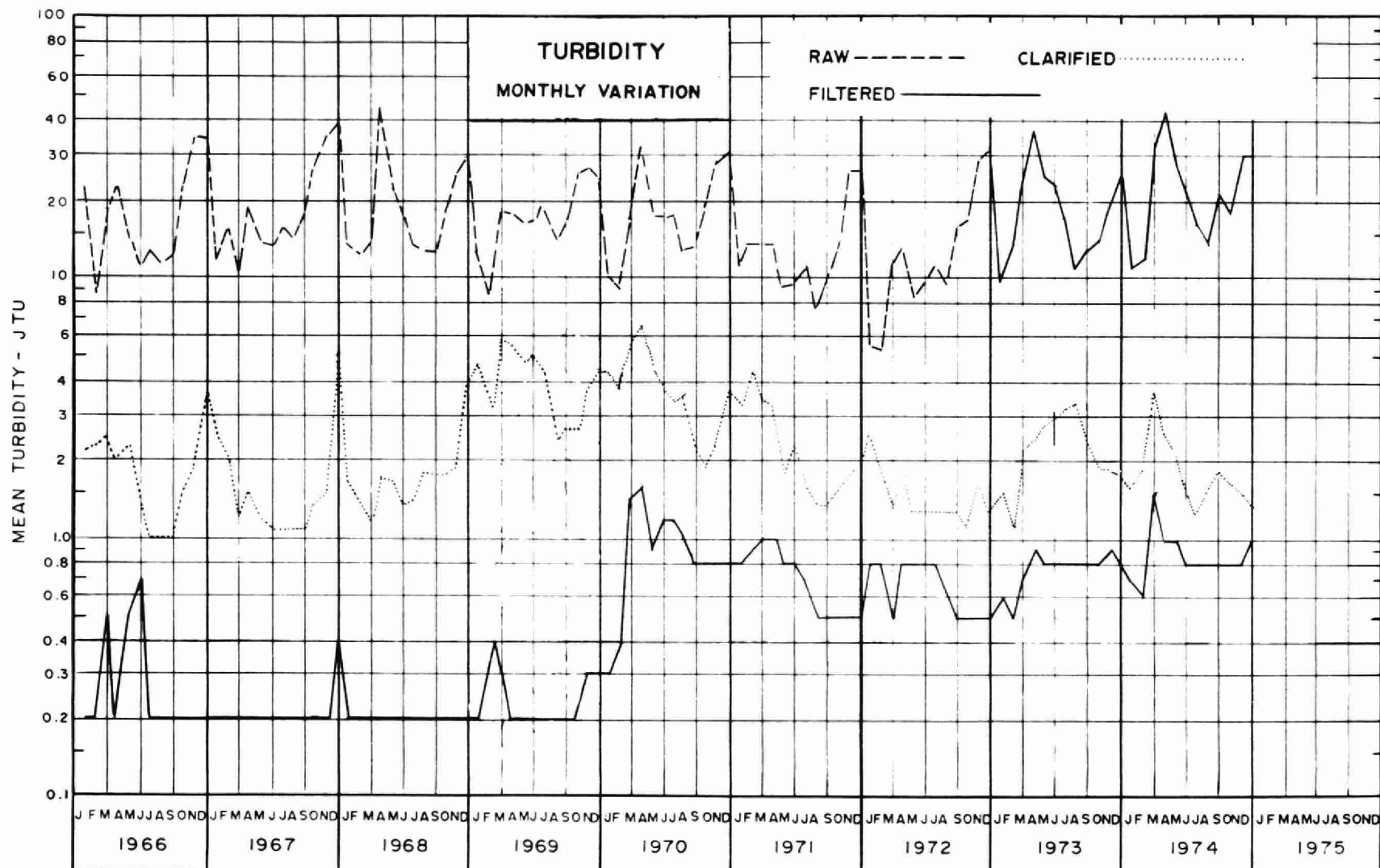
FLOWS



DESIGN CAPACITY 16 MGD

PLANT PERFORMANCE

MONTH	FLOWS				RAW WATER		TREATED WATER					
	TOTAL PLANT OUTPUT million gallons	AVERAGE DAILY FLOW million gallons	MAXIMUM DAY'S FLOW million gallons	MAXIMUM RATE mgd	TURBIDITY (AVERAGE) FTU	COLOUR (AVERAGE) App. units	TURBIDITY		COLOUR		TEMPERATURE	
							AVERAGE FTU	MAXIMUM FTU	AVERAGE App. units	MAXIMUM App. units	AVERAGE ° F	MAXIMUM ° F
JAN	121.26	3.91	4.66	6.62	11.5	3	.9	1.0	<5	<5	33	33
FEB	103.38	3.69	4.53	6.62	12.6	<5	.8	1.0	<5	<5	33	33
MAR	112.86	3.64	4.55	7.06	34.0	15	1.6	4.9	<5	<5	35	36
APR	118.92	3.96	5.12	7.78	43.0	12	.9	1.0	<5	<5	43	50
MAY	143.28	4.62	6.13	8.93	29.0	10	.9	1.2	<5	<5	53	56
JUNE	164.33	5.48	8.06	11.23	22.0	12	.7	.8	<5	<5	66	70
JULY	261.04	8.42	10.51	14.11	16.0	8	.7	.8	<5	<5	72	73
AUG	243.80	7.86	10.25	13.68	14.0	5	.8	.8	<5	<5	74	75
SEPT	181.49	6.05	7.75	10.80	21.0	5	.8	.8	<5	<5	67	73
OCT	156.21	5.04	6.97	7.92	19.0	12	.7	.8	<5	<5	53	60
NOV	137.07	4.57	6.03	7.92	30.0	20	.8	1.0	<5	<5	44	48
DEC	113.02	3.65	5.13	7.49	30.0		.9	1.0	<5	<5	34	39
TOTAL	1856.66											
AVG.		5.09	MAXIMUM 10.51	MAXIMUM 14.11	23.5	9	.9	MAXIMUM 4.9	<5	MAXIMUM <5	51	MAXIMUM 75



TREATMENT DATA

MONTH	FILTER OPERATION		CHEMICALS USED							
	BACKWASH	TOTAL	A L U M		ACTIVATED CARBON		SODIUM SILICATE		SODIUM BICARBONATE	
	WATER mil. gal.	FILTER HOURS	AMOUNT USED 10 ³ gallons	DOSAGE mg/l	AMOUNT USED pounds	DOSAGE mg/l	AMOUNT USED 10 ³ pounds	DOSAGE mg/l	AMOUNT USED pounds	DOSAGE mg/l
JAN	1.568	1328	3.6	19	0		1116	4.7	252	1.1
FEB	1.344	1217	3.3	21	0		1116	5.0	252	1.1
MAR	1.960	1280	4.6	26	0		930	5.1	210	1.1
APR	1.736	1372	4.9	27	0		1674	4.7	378	1.1
MAY	1.792	1582	5.8	26	0		1674	4.0	378	.9
JUNE	2.070	1833	7.2	28			1674	3.4	378	.8
JULY	3.360	2553	10.9	27	420	1.2	2418	2.2	546	.5
AUG	2.912	2469	10.4	28	560	1.4	2046	2.4	462	.5
SEPT	2.520	1955	6.9	25	555	3.0	1674	3.1	378	.7
OCT	1.680	1681	6.5	27	450	4.4	1674	3.7	378	.8
NOV	2.184	1673	6.4	30	200	4.3	1674	4.1	378	.9
DEC	1.680	1391	5.7	33	0		1674	5.1	378	1.1
TOTAL	24.806	20334	76.2		2185		19344		4368	
AVG		1695	6.4	27	146	2.9	186	3.7	42	.8

WATER QUALITY

PROPERTY	RAW WATER				TREATED WATER				DESIRABLE STANDARDS
	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	NUMBER OF SAMPLES	AVERAGE	MAXIMUM	MINIMUM	
HARDNESS in mg/l as CaCO_3	21	125	146	114	21	122	136	112	80 - 100
ALKALINITY in mg/l as CaCO_3	21	81	89	80	21	70	75	62	30 - 100
IRON in mg/l Fe	21	1.04	2.40	.10	21	<.05	.05	<.05	Less than 0.3
CHLORIDE in mg/l Cl^-	21	26	140	16	21	23	28	18	Less than 250
pH in pH units	21	8.1	8.5	7.7	21	7.5	7.8	7.2	7.0 - 8.5

CHLORINATION and DISINFECTION

MONTH	RAW WATER					PLANT EFFLUENT		DISTRIBUTION SYSTEM		CHLORINATION			
	NUMBER OF SAMPLES HAVING TOTAL COLIFORM ORGANISMS PER 100 ml OF					NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	NUMBER OF SAMPLES TAKEN	NUMBER HAVING COLIFORM ORGANISMS	TOTAL AMOUNT OF CHLORINE USED 10 ³ pounds	DOSAGE		RESIDUAL IN PLANT EFFLUENT mg/l
											PRE - mg/l	POST - mg/l	
	0	1 - 3	4 - 32	33 - 320	> 320								
JAN	0	0	1	1	2	4	0	37	0	1.9	1.2	.4	.5
FEB	1	0	3	0	0	4	0	38	0	1.7	1.2	.4	.5
MAR	0	0	2	2	0	4	0	38	0	1.9	1.2	.4	.5
APR	0	0	2	2	1	5	0	50	0	2.3	1.4	.5	.5
MAY	1	0	0	2	0	3	0	28	0	3.6	1.8	.6	.5
JUNE	0	0	0	3	0	3	0	29	0	6.0	2.6	.9	.5
JULY	0	0	2	1	0	3	0	26	0	11.0	3.3	1.0	.5
AUG	1	0	0	2	0	3	0	28	0	8.8	2.2	1.0	.5
SEPT	0	0	3	2	0	5	0	47	0	6.4	2.8	.8	.5
OCT	0	0	0	2	0	2	0	18	0	4.2	2.1	.7	.5
NOV	0	0	0	1	0	1	0	9	0	2.4	1.3	.4	.5
DEC	0	0	0	0	0	0	0	0	0	1.9	1.4	.4	.5
TOTAL	3	0	13	18	3	37	0	348	0	52.0			
AVG.	37												
	(NOTE - Average shown is the GEOMETRIC MEAN)									pounds per day	1.9	.6	.5

LABORATORY LIBRARY



96936000119901

Date Due

MAR 19 1976			

LAB

PRINTED IN CANADA